

WHAT IS CLAIMED IS

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1. A transmission apparatus comprising:
 - a multiplexing and demultiplexing section which carries out a multiplexing and a demultiplexing; and
 - an order wire section which converts received
- 10 order wire signals demultiplexed by said multiplexing and demultiplexing section into analog signals, and converts transmitting order wire signals into digital signals which are input to said multiplexing and demultiplexing section,
- 15 said order wire section comprising:
 - a codec section carrying out an analog-to-digital conversion and a digital-to-analog conversion with respect to order wire signals;
 - a branching and combining section
- 20 branching and combining analog order wire signals;
- a 2-wire/4-wire converter which is capable of coupling to a telephone set; and
- a monitoring processor which includes a storage section storing transmitting and received
- 25 data, and an order wire monitoring controller, said order wire monitoring controller controlling transmission of test data stored in said storage section to an order wire line, controlling storage of test data received via the order wire
- 30 line to said storage section, and controlling transmission and reception of one of the received test data, analyzed data of the received test data, and judgement data indicative of a judgement result of a comparison of the analyzed data and threshold
- 35 values.

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2. The transmission apparatus as claimed in claim 1, wherein said monitoring processor further includes:

5 a data analyzer which analyzes the received test data stored in said storage section and obtains analyzed data; and

10 a comparing and judging section which obtains the judgement data indicative of a judgement based on a comparison of the analyzed data and the threshold values,

15 said order wire monitoring controller controlling said storage section and said data analyzer, and controlling transmission of the judgement data from said comparing and judging section.

20 3. The transmission apparatus as claimed in claim 1, wherein said order wire monitoring controller stores audio data in said storage section as the received test data, and controlling a loop-back transmission of the audio data stored in said
25 storage section to a transmitting source, in response to a lapse of a predetermined time or a transmission instruction.

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4. An order wire transmission system which couples a plurality of transmission apparatuses via multiplexed lines which multiplex
35 and transmit main and order wire signals, wherein:
each transmission apparatus includes a multiplexing and demultiplexing section and an order

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wire section, said order wire section comprising a
codec section carrying out an analog-to-digital
conversion and a digital-to-analog conversion with
respect to order wire signals, a branching and
5 combining section branching and combining analog
order wire signals, a 2-wire/4-wire converter which
is capable of coupling to a telephone set, and a
monitoring processor;

10 said monitoring processor including a storage
section storing transmitting and received data, and
an order wire monitoring controller which controls
transmission of test data stored in said storage
section to an order wire line, controls storage of
test data received via the order wire line to said
15 storage section, and controlling transmission of the
received test data and analyzed data of the received
test data; and

20 said order wire monitoring controller including
a function of receiving and identifying control
information which specifies transmission or
reception of the test data, a function of
transmitting the test data from said storage section
when specified to transmit test data, a function of
receiving and storing the test data in said storage
25 section when specified to receive the test data, and
a function of controlling transmission of one of the
received test data stored in said storage section,
the analyzed data of the received test data, and
judgement data indicative of a judgement result of a
30 comparison of the analyzed data and threshold values,
after a predetermined time or at a specified time.

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5. The order wire transmission system as
claimed in claim 4, wherein said monitoring

a data analyzer which analyzes the received test data stored in said storage section and obtains the analyzed data; and

said order wire monitoring controller
controlling said storage section and said data
analyzer, reception and identification of control
information specifying transmission or reception of
the test data, controlling transmission of the test
data via the order wire line, controlling
transmission of the judgement data from said
comparing and judging section, and controlling
reception of the test data via the order wire line.

6. The order wire transmission system as claimed in claim 4, wherein said order wire monitoring controller in said monitoring processor of each transmission unit stores audio data in said storage section as the received test data, and controlling a loop-back transmission of the audio data stored in said storage section to a transmitting source, in response to a lapse of a predetermined time or a transmission instruction.

35 7. An order wire monitoring method for
monitoring a quality of an order wire line which
couples a plurality of transmission apparatuses via

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multiplexed lines which multiplex and transmit main and order wire signals, comprising the steps of:

specifying a transmission apparatus which is to transmit test data as a specified transmitting apparatus, and a transmission apparatus which is to receive test data as a specified receiving apparatus;

transmitting the test data from the specified transmitting apparatus to the order wire line in response to a start of test;

receiving and temporarily storing the test data in the specified receiving apparatus;

transmitting to the specified transmitting apparatus one of the stored received test data, analyzed data of the received test data, and judgement data indicative of a judgement result of a comparison of the analyzed data and threshold values, after a predetermined time or at a specified time; and

monitoring, in the specified transmitting apparatus, the quality of the order wire line between the specified transmitting apparatus and the specified receiving apparatus.

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8. The order wire monitoring method as claimed in claim 7, which further comprises the step of:

converting DTMF signals into digital signals, and transmitting the digital signals to the order wire line as the test data, from at least one of the specified transmitting apparatus and the specified receiving apparatus.

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9. The order wire monitoring method as claimed in claim 7, which further comprises the step of:

judging an error in setting or connection of the order wire line if a condition $S'/S < W$ is satisfied, where S' denotes a signal level of a fundamental wave of the analyzed data obtained by carrying out a discrete Fourier transform with respect to the received test data, N_{\max} denotes a maximum noise level, and S denotes a signal level of the transmitting test data.

10. The order wire monitoring method as claimed in claim 9, which further comprises the step of:

judging a failure of the order wire line caused by accumulation of quantization errors if at least one of conditions $(S'/S) < T$, $(S'/N_{\max}) < U$ and $N_{\max} > V$ is satisfied, where T , U and V are threshold values, T denotes a signal level with which communication is possible, U denotes a signal-to-noise ratio level with which communication is possible, and V denotes a set noise level.

11. The order wire monitoring method as claimed in claim 7, which further comprises the step of:

judging a failure of the order wire line caused by accumulation of quantization errors if at least one of conditions $(S'/S) < T$, $(S'/N_{\max}) < U$ and $N_{\max} > V$ is satisfied, where S' denotes a signal level of

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